

# PURE SUBSTANCES VERSUS MIXTURES

## **Pure Substance =**

- Matter that has a definite chemical composition and cannot be separated into other substances by any mechanical process
- 2 types of pure substances are elements and compounds

- **Element** =
  - A pure substance that cannot be broken down into other substances by chemical or physical means
  - Examples
    - Sodium (Na)
    - Chlorine (Cl)
    - Oxygen (O)
- **Compound** =
  - A pure substance consisting of two or more elements combined
  - Examples
    - Sodium chloride
    - Water

**Mixture** =

- Combination of 2 or more different materials that are NOT chemically combined
- Can usually be separated back into its original components by mechanical means

- **Heterogeneous** =

- Different throughout
- No definite composition
- Examples:
  - Granite
  - Salad

- **Suspension** =

- Particles of a substance are mixed with a fluid but are not dissolved
- Suspended particles will eventually settle out
- Example: muddy water

- **Homogeneous** =
  - Same throughout
  - All samples are identical
  - Examples:
    - Kool-Aid
    - Alloys, Colloids, Solutions

# HOMOGENEOUS MIXTURES

- **Alloy** =

- Mixture that contains at least one metal
- Example
  - Steel (mixture of carbon and iron)

- **Colloid** =

- A type of mechanical mixture where one substance is dispersed evenly throughout another
- Has components of 1 or 2 phases
- Examples:
  - Jello, shaving cream, glue



## **Solution** =

- A homogeneous mixture of a solvent and a solute

## **Solute** =

- The substance that is dissolved
- It is dissolved by the solvent
- It is the substance in smaller proportion
- Not always solid!

## **Solvent =**

- The substance that does the dissolving
- It dissolves the solute
- It is the substance in larger proportion
- Not always liquid!

## **Aqueous solution =**

- Solution in which water is the solvent

# DISSOLVING VOCABULARY

**Soluble** =

- Able to dissolve (in a specific solvent)

**Insoluble** =

- Unable to dissolve (in a specific solvent)

**Solubility** =

- The amount of solute that will completely dissolve in a solvent at a given temperature and pressure
- Usually measured in grams of solute per unit volume of solvent
  - Example: grams per liter
- Solubility changes with temperature

### **Saturated Solution =**

- A solution that will not dissolve any more solute at a given temperature or pressure

### **Supersaturated Solution =**

- A solution that contains more of the dissolved material than could be dissolved by the solvent under normal circumstances

Note:

- Solutes do not just disappear!
  - They dissolve
- Dissolving is not the same as melting!

# SEPARATING SOLIDS FROM LIQUIDS

Remember, a mixture is NOT chemically combined,  
so it can usually be separated  
back into its original components  
by *mechanical* means.

## **Filtration** =

- Process of separating a solid and a liquid by passing a mixture of the two through a mesh (filter paper)
- Used to separate ***insoluble*** solids from liquids
- Filtration can NOT remove a solute from a solution
- **Filtrate** =
  - Substances that pass through the filter paper
- **Residue** =
  - Remains on the filter paper



## **Sedimentation =**

- The process by which an ***insoluble*** solid settles out from a solid/liquid mixture
- **Sediment =**
  - The solid that collects below the liquid
- Process can be speeded up by a centrifuge
  - Spins the substance

## **Evaporation =**

- Process used to separate a solid solute from the solvent in which it is dissolved by allowing the liquid to turn into a gas
  - Example:
    - Salt from water
- Speed up the process by heating the solution